

**Amendments to the claims:**

**Cancel claims 1, 2, 3, 4, 5, 15 and 25.**

**Claims 6, 16 and 16 are amended.**

**New claims 44-52 are added.**

1.- 5. (Cancelled)

6. (Currently Amended) ~~A spin valve transistor as claimed in claim 4 wherein~~ A spin valve transistor comprising:

an emitter;

a collector;

a base between the emitter and the collector;

a spin valve including:

a ferromagnetic free layer structure;

a self-pinned antiparallel (AP) pinned layer structure without any pinning structure pinning the self-pinned AP pinned layer structure; and

a nonmagnetic spacer layer between the free layer structure and the AP pinned layer structure; and

the base comprising at least said free layer structure;

the self pinned AP pinned layer structure comprising:

a ferromagnetic first antiparallel (AP) pinned layer;

a ferromagnetic second antiparallel (AP) pinned layer;

a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP pinned layers;

one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a positive magnetostriction;

the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned layer structure; and

the first and second AP pinned layers [[have]] having the same magnetic thickness.

1           7.     (Previously Presented) A spin valve transistor comprising:  
2     an emitter;  
3     a collector;  
4     a base between the emitter and the collector;  
5     a spin valve including:  
6             a ferromagnetic free layer structure composed of iron (Fe);  
7             a self-pinned antiparallel (AP) pinned layer structure;  
8             a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
9     structure; and  
10            the free layer structure interfacing the spacer layer;  
11     the base comprising at least said free layer structure;  
12     the self pinned AP pinned layer structure including:  
13            a ferromagnetic first antiparallel (AP) pinned layer;  
14            a ferromagnetic second antiparallel (AP) pinned layer; and  
15            a nonmagnetic antiparallel coupling (APC) layer located between the first and  
16     second AP pinned layers;  
17     the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
18     the second AP pinned layer including:  
19            an iron (Fe) film;  
20            a cobalt iron (CoFe) film with a positive magnetostriction;  
21            the iron (Fe) film being located between and interfacing the APC layer and the  
22     cobalt iron (CoFe) film; and  
23            the CoFe film having a magnetostrictive anisotropy field that is oriented  
24     perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
25     layer structure.

1           8.     (Original)     A spin valve transistor as claimed in claim 7 wherein the cobalt iron  
2     is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           9.     (Previously Presented)     A spin valve transistor as claimed in claim 7 wherein the  
2 cobalt iron (CoFe) film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           10.    (Original)     A spin valve transistor as claimed in claim 9 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           11.    (Withdrawn)    A spin valve transistor as claimed in claim 4 further comprising:  
2 the second AP pinned layer being composed of iron (Fe);  
3 the first AP pinned layer including:  
4               first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer  
5 layer;  
6               said cobalt iron (CoFe) film; and  
7               the cobalt iron (CoFe) film being located between and interfacing the first and  
8 second iron (Fe) films.

1           12.    (Withdrawn)    A spin valve transistor as claimed in claim 11 wherein the cobalt  
2 iron film is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           13.    (Withdrawn)    A spin valve transistor as claimed in claim 12 wherein the cobalt  
2 iron film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           14.    (Withdrawn)    A spin valve transistor as claimed in claim 13 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

15.    (Cancelled)

1           16.    (Currently Amended)    ~~A magnetic head assembly as claimed in claim 15 wherein~~  
2 A magnetic head assembly comprising:  
3 a write head;  
4 a read head adjacent the write head;  
5 the read head including:  
6 ferromagnetic first and second shield layers; and  
7 a spin valve transistor located between the first and second shield layers;

the spin valve transistor comprising:  
an emitter;  
a collector;  
a base between the emitter and the collector;  
a spin valve including:  
a ferromagnetic free layer structure;  
a self-pinned antiparallel (AP) pinned layer structure without any pinning  
structure pinning the self-pinned AP pinned layer structure;  
a nonmagnetic spacer layer between the free layer structure and the AP  
pinned layer structure; and  
the base comprising at least said free layer structure;  
the self pinned AP pinned layer structure ~~comprises:~~ comprising:  
a ferromagnetic first antiparallel (AP) pinned layer;  
a ferromagnetic second antiparallel (AP) pinned layer;  
a nonmagnetic antiparallel coupling (APC) layer located between the first and  
second AP pinned layers;  
one of the first and second AP pinned layers having a cobalt iron (CoFe) film with  
a positive magnetostriction; ~~[[and]]~~  
the CoFe film having a magnetostrictive anisotropy field that is oriented  
perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
layer structure~~[[.]]~~; and  
the first and second AP pinned layers having the same magnetic thickness.

17. (Previously Presented) A magnetic head assembly comprising:  
a write head;  
a read head adjacent the write head;  
the read head including:  
ferromagnetic first and second shield layers; and  
a spin valve transistor located between the first and second shield layers;  
the spin valve transistor comprising:  
an emitter;  
a collector;  
a base between the emitter and the collector;

11 a spin valve including:  
 12 a ferromagnetic free layer structure composed of iron (Fe);  
 13 a self-pinned antiparallel (AP) pinned layer structure;  
 14 a nonmagnetic spacer layer between the free layer structure and the AP  
 15 pinned layer structure; and  
 16 the free layer structure interfacing the spacer layer;  
 17 the base comprising at least said free layer structure;  
 18 the self pinned AP pinned layer structure including:  
 19 a ferromagnetic first antiparallel (AP) pinned layer;  
 20 a ferromagnetic second antiparallel (AP) pinned layer; and  
 21 a nonmagnetic antiparallel coupling (APC) layer located between the first and  
 22 second AP pinned layers;  
 23 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;  
 24 the second AP pinned layer including:  
 25 an iron (Fe) film;  
 26 a cobalt iron (CoFe) film with a positive magnetostriction;  
 27 the iron (Fe) film being located between and interfacing the APC layer and the  
 28 cobalt iron (CoFe) film; and  
 29 the CoFe film having a magnetostrictive anisotropy field that is oriented  
 30 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
 31 layer structure.

1 18. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein  
 2 the cobalt iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1 19. (Previously Presented) A magnetic head assembly as claimed in claim 17 wherein  
 2 the cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1 20. (Original) A magnetic head assembly as claimed in claim 19 wherein the first  
 2 and second AP pinned layers have the same magnetic thickness.

1           21.     (Withdrawn)     A magnetic head assembly as claimed in claim 16 further  
2 comprising:

3           the second AP pinned layer being composed of iron (Fe);

4           the first AP pinned layer including:

5                 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer  
6 layer;

7                 said cobalt iron (CoFe) film; and

8                 the cobalt iron (CoFe) film being located between and interfacing the first and  
9 second iron (Fe) film.

1           22.     (Withdrawn)     A magnetic head assembly as claimed in claim 21 wherein the  
2 cobalt iron film is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           23.     (Withdrawn)     A magnetic head assembly as claimed in claim 22 wherein the cobalt  
2 iron film is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           24.     (Withdrawn)     A magnetic head assembly as claimed in claim 23 wherein the first  
2 and second AP pinned layers have the same magnetic thickness.

25.     (Cancelled)

1           26.     (Currently Amended)     ~~A magnetic disk drive as claimed in claim 25 wherein A~~  
2 magnetic disk drive comprising:

3           at least one magnetic head assembly that has a head surface;

4           the magnetic head assembly having a write head and a read head;

5           the read head including:

6                 ferromagnetic first and second shield layers; and

7                 a spin valve transistor located between the first and second shield layers;

8           the spin valve transistor comprising:

9                 an emitter;

10                 a collector;

11                 a base between the emitter and the collector;

12 a spin valve including:  
 13 a ferromagnetic free layer structure;  
 14 a self-pinned antiparallel (AP) pinned layer structure without any pinning structure  
 15 pinning the self-pinned AP pinned layer structure;  
 16 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer  
 17 structure; and  
 18 the base comprising at least said free layer structure;  
 19 the self pinned AP pinned layer structure ~~comprises:~~ comprising:  
 20 a ferromagnetic first antiparallel (AP) pinned layer;  
 21 a ferromagnetic second antiparallel (AP) pinned layer;  
 22 a nonmagnetic antiparallel coupling (APC) layer located between the first and  
 23 second AP pinned layers;  
 24 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with  
 25 a positive magnetostriction; ~~[[and]]~~  
 26 the CoFe film having a magnetostrictive anisotropy field that is oriented  
 27 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned  
 28 layer structure~~[[.]]~~; and  
 29 the first and second AP pinned layers having the same magnetic thickness;  
 30 a housing;  
 31 a magnetic medium supported in the housing;  
 32 a support mounted in the housing for supporting the magnetic head assembly with said head  
 33 surface facing the magnetic medium so that the magnetic head assembly is in a transducing  
 34 relationship with the magnetic medium;  
 35 a motor for moving the magnetic medium; and  
 36 a processor connected to the magnetic head assembly and to the motor for exchanging  
 37 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 27. (Previously Presented) A magnetic disk drive comprising:  
 2 at least one magnetic head assembly that has a head surface;  
 3 the magnetic head assembly having a write head and a read head;  
 4 the read head including:  
 5 ferromagnetic first and second shield layers; and  
 6 a spin valve transistor located between the first and second shield layers;

the spin valve transistor comprising:

- an emitter;
- a collector;
- a base between the emitter and the collector;

a spin valve including:

- a ferromagnetic free layer structure composed of iron (Fe);
- a self-pinned antiparallel (AP) pinned layer structure;
- a nonmagnetic spacer layer between the free layer structure and the AP pinned layer structure; and

the free layer structure interfacing the spacer layer;

the base comprising at least said free layer structure;

the self pinned AP pinned layer structure including:

- a ferromagnetic first antiparallel (AP) pinned layer;
- a ferromagnetic second antiparallel (AP) pinned layer; and
- a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP pinned layers;

the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

the second AP pinned layer including:

- an iron (Fe) film with a positive magnetostriction;
- a cobalt iron (CoFe) film;
- the iron (Fe) film being located between and interfacing the APC layer and the cobalt iron (CoFe) film; and

the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned layer structure;

a housing;

a magnetic medium supported in the housing;

a support mounted in the housing for supporting the magnetic head assembly with said head surface facing the magnetic medium so that the magnetic head assembly is in a transducing relationship with the magnetic medium;

a motor for moving the magnetic medium; and

a processor connected to the magnetic head assembly and to the motor for exchanging signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1           28.   (Original)   A magnetic disk drive as claimed in claim 27 wherein the cobalt iron  
2 is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           29.   (Previously Presented)   A magnetic disk drive as claimed in claim 27 wherein the  
2 cobalt iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           30.   (Original)   A magnetic disk drive as claimed in claim 29 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           31.   (Withdrawn)   A magnetic disk drive as claimed in claim 26 further comprising:  
2 the second AP pinned layer being composed of iron (Fe);  
3 the first AP pinned layer including:  
4           first and second iron (Fe) films with the first iron (Fe) layer film interfacing the  
5 spacer layer;  
6           said cobalt iron (CoFe) film; and  
7           the cobalt iron (CoFe) film being located between and interfacing the first and  
8 second iron (Fe) film.

1           32.   (Withdrawn)   A magnetic disk drive as claimed in claim 31 wherein the cobalt  
2 iron is  $\text{Co}_{90-50}\text{Fe}_{10-50}$ .

1           33.   (Withdrawn)   A magnetic disk drive as claimed in claim 32 wherein the cobalt  
2 iron is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           34.   (Withdrawn)   A magnetic disk drive as claimed in claim 33 wherein the first and  
2 second AP pinned layers have the same magnetic thickness.

1           35.   (Previously Presented)   A spin valve transistor as claimed in claim 9 wherein the  
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           36.   (Previously Presented)   A spin valve transistor as claimed in claim 35 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           37.   (Previously Presented)   A spin valve transistor as claimed in claim 36 wherein  
2 the first and second AP pinned layers have the same magnetic thickness.

1           38.   (Previously Presented)   A magnetic head assembly as claimed in claim 19  
2 wherein the base further comprises the self-pinned antiparallel (AP) pinned layer structure and the  
3 spacer layer.

1           39.   (Previously Presented)   A magnetic head assembly as claimed in claim 38 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           40.   (Previously Presented)   A magnetic head assembly as claimed in claim 39  
2 wherein the first and second AP pinned layers have the same magnetic thickness.

1           41.   (Previously Presented)   A magnetic disk drive as claimed in claim 29 wherein the  
2 base further comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           42.   (Previously Presented)   A magnetic disk drive as claimed in claim 41 further  
2 comprising a barrier layer located between the emitter and the base for conducting hot electrodes  
3 from the emitter to the base wherein the hot electrons have an energy level above Fermi levels of  
4 the layers in said base.

1           43.   (Previously Presented)   A magnetic disk drive as claimed in claim 42 wherein the  
2 first and second AP pinned layers have the same magnetic thickness.

1           44.   (New)   A spin valve transistor as claimed in claim 6 wherein at least one of the  
2   AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           45.   (New)   A spin valve transistor as claimed in claim 44 wherein the base further  
2   comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           46.   (New)   A spin valve transistor as claimed in claim 45 further comprising a barrier  
2   layer located between the emitter and the base for conducting hot electrons from the emitter to  
3   the base wherein the hot electrons have an energy level above Fermi levels of the layers in said  
4   base.

1           47.   (New)   A magnetic head assembly as claimed in claim 16 wherein at least one of  
2   the AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           48.   (New)   A magnetic head assembly as claimed in claim 47 wherein the base further  
2   comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           49.   (New)   A magnetic head assembly as claimed in claim 48 further comprising a  
2   barrier layer located between the emitter and the base for conducting hot electrons from the  
3   emitter to the base wherein the hot electrons have an energy level above Fermi levels of the layers  
4   in said base.

1           50.   (New)   A magnetic disk drive as claimed in claim 26 wherein at least one of the  
2   AP pinned layers is  $\text{Co}_{50}\text{Fe}_{50}$ .

1           51.   (New)   A magnetic disk drive as claimed in claim 50 wherein the base further  
2   comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1           52.   (New)   A magnetic disk drive as claimed in claim 51 further comprising a barrier  
2   layer located between the emitter and the base for conducting hot electrons from the emitter to  
3   the base wherein the hot electrons have an energy level above Fermi levels of the layers in said  
4   base.